PATENT SPECIFICATION (11) 1 483 622

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(21) Application No. 41172/74 (22) Filed 20 Sept. 1974

(44) Complete Specification published 24 Aug. 1977

(51) INT. CL.[2] E04B 2/60

(52) Index at acceptance
E1W 4B10 4B12 4B18 4B20 4B23 4B47 4B4 4B60

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(19)

(54) IMPROVEMENTS IN OR RELATING TO SOUND ATTENUATING WALLS

(71) We, BPA BYGGPRODUKTION AB, a company duly organized and existing under the laws of Sweden, of Box 45 126, 104 30 Stockholm 45, Sweden, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a sound attenuating wall including a skeleton frame, a surface covering fixed on either side of said frame, and insulating material disposed in the space or spaces between the skeleton frame members and between the surface coverings.

To impart sound attenuation ability to so-called lightwall type partition walls it is necessary at present to provide a double skeleton frame so that the surface covering on either side of the wall is supported by its respective separate frame. The two frames or skeleton frame structures should not be interconnected. In partitions where use has been made of steel columns the skeleton frame members have thus been placed in pairs, often offset laterally with respect to each other, leaving a certain space therebetween, which has been difficult in point of mounting and also entailed high costs. The double frames, however, have hitherto been considered as indispensable where requirements are placed on the sound insulation property.

According to the present invention, there is provided a sound attenuating wall comprising a skeleton frame made up from a plurality of elongate skeleton frame members, and a surface covering fixed on either side of said frame, the frame members consisting of two parts, each having an outer portion to which the covering is attached and an inner flange portion the plane of which extends parallel to or at an acute angle to the plane of the wall, the flange portions being adjacent and connected through an acute bend by weakened bridging portions which are arranged along the length of the members and permit movement between the two parts, at right angles to their length, to take place by bending of the bridging portions.

At the present time, a layer of mineral wool or like insulating material that covers the entire wall surface is utilized for the sound insulation of partitions comprising a frame and surface layers. The layer of insulating material may be of such a thickness as to fill out the entire space between the two surface layers of the skeleton frame wall, but in most cases the insulating measures are confined to the mounting of a layer covering the entire wall surface and having a thickness less than the width of the space. It should be observed that in the case contemplated the insulation is not intended to serve as heat insulation but only as sound attenuation means.

The insulating material, which may be mineral wool or like material, preferably fills out a restricted part only of each of the spaces existing between the skeleton frame members and between the surface coverings in a wall according to the present invention.

Embodiments of the invention will be described in greater detail hereinbelow, by way of example, with reference to the accompanying drawings in which:

Fig. 1 is a perspective view of a design of a sheet steel skeleton frame member for a partition wall;

Fig. 2 is a perspective view of a modified embodiment of a sheet steel skeleton frame member;

Fig. 3 diagrammatically shows a still more modified embodiment in which the sheet steel skeleton frame member is combined with a wooden frame portion;

Fig. 4 illustrates how the sheet steel frame

members can be manufactured;

Figs. 5 and 6 show cross sections of walls, in which the insulation is mounted in different ways.

It may be said that the skeleton frame members according to the invention consist of two halves or parts which, as shown in Figs. 1 and 2, may be of U-shape. The skeleton frame member illustrated in Fig. 1 has outer flanges 2 which are higher than the inner flanges 3, whereas in the skeleton frame member 4 according to Fig. 2 the outer flange 5 and the inner flange 6 have substantially the same height. The design of each half need not differ very much from that known and utilized today. However, the inner flanges 3 and 6 of the skeleton frame members are interconnected. In the embodiment illustrated the interconnection is realized by means of relatively narrow strips 7 and 8, respectively.

In the embodiment illustrated in Fig. 3, the structure is composed of a sheet steel member 9 and a portion 10 of wood or other material which may be incorporated as a load carrying element. This embodiment is specially suited when wood or other material is required in point of strength and is used as a load-supporting structure. By way of uses, mention may be made of facade walls, partition walls, framing of joists etc. The sheet steel member 9 substantially corresponds to one half of the member shown in Fig. 1, but instead of the other half the flange 3′ merges into a planar portion 11. The portion of wood or other material may be a conventional wood element, a sheet steel beam or other element suitable in point of strength, which is secured to the portion 11.

The connection between the two flanges 3′ is realized also in this case by means of strips 7′.

The skeleton frame members can suitably be produced in a conventional bending process, in which the transition between the two halves of the structure is left unbroken. The material between the strips 7 and 8 may be removed, as illustrated in Fig. 4, by means of a cam-controlled grinding wheel 13 or like means.

The skeleton frame members can also be produced in a pressing operation, in which case the material between the strips 7 and 8 can be removed by grinding or punching.

It should be mentioned that the embodiment in which strips of materials are left in place, is not the only one possible. Instead of providing spaced strips it is possible to reduce the thickness of the metal sheet at the portion bridging the halves of the skeleton frame member, for instance by partially grinding away material or by providing one or more pressed-in grooves along the bridging portion.

The sound attenuating bridging between the flanges can also be realized by making the flanges connecting the halves of the skeleton frame member together, considerably wider than those illustrated. By extending the inner flanges the skeleton frame structure will have an increased bending resistance but at the same time the advantage is gained that its sound attenuation property increases. The interconnected inner flanges will in fact act as levers, whereby the two halves of the skeleton frame structure will be resiliently interconnected via the weakened bridging portion between the flanges. Thus it will be more difficult for vibrations in one half of the structure to pass over into the other half. The embodiment illustrated in the drawing and described above will be the most suitable one, as far as can be judged at present.

As a rule, an insulating layer is arranged in sound attenuating partition walls along the entire wall surface as is indicated at 14 in Fig. 5. The insulation is allowed to fill out the entire space between the outer sides 15 and 16 of the wall. Usually, however, the space is not entirely filled out. The structure according to the invention at one and the same wall thickness provides a higher sound isolation which — for reaching a certain sound insulation level — permits a great simplification of the design of the insulation inside the wall between the coverings, thereby making the construction less expensive both in point of material and labor. Tests have shown that good sound insulating properties can be obtained if, as shown at 17 in Fig. 6, the space between the walls is filled out only up to a certain level and the remaining space between the wall surfaces is left empty. This means that a considerable saving of insulating material can be made, and moreover, the mounting of the wall will be facilitated as it is possible to mount the insulation in a simpler way when a complete coverage of the entire wall surface is not required.

Of course, it need not be the lower portion of the wall space that is filled out. It would be conceivable to arrange the insulation somewhere at the middle portion of the wall or at the upper portion of the space. However, for several reasons, an insulation provided at the bottom will be preferable, particularly for ease of mounting.

The insulation can be mounted in a very simple manner in that the insulating material — without the use of scaffolds — can be mounted from floor level. As insulating material, use can be made of bulk material which is considerably cheaper than material in the form of mats. As distinct from a mounting over the entire wall surface no fastening devices are required for the in-

sulation. The necessary quantity of insulating material will be less than that required for an insulation arranged in a conventional manner.

Experiments have shown that a space between two skeleton frame members and their surface coverings should preferably be filled with insulating material up to about two fifths whereas the remaining space is left unfilled.

While the invention has been described with particular reference to the embodiments described above and illustrated in the drawing, those skilled in the art will realize that the invention can be modified in several ways within the scope of the appended claims.

WHAT WE CLAIM IS:—

1. A sound attenuating wall comprising a skeleton frame made up from a plurality of elongate skeleton frame members, and a surface covering fixed on either side of said frame, the frame members consisting of two parts, each having an outer portion to which the covering is attached and an inner flange portion the plane of which extends parallel to or at an acute angle to the plane of the wall, the flange portions being adjacent and connected through an acute bend by weakened bridging portions which are arranged along the length of the members and permit movement between the two parts, at right angles to their length, to take place by bending of the bridging portions.

2. A sound attenuating wall as claimed in claim 1, wherein the two parts are U-sections.

3. A sound attenuating wall as claimed in claim 1, wherein one part is a U-section whereas the other part has a portion of wood or other material adjoining its flange portion.

4. A sound attenuating wall as claimed in claim 2 or 3, wherein the weakened bridging portions of material interconnecting the frame member parts are narrow strips left after a portion of material connecting the adjoining flanges has been ground away.

5. A sound attenuating wall as claimed in claim 2 or 3, wherein the bridging portions of material are a connecting web between adjoining flanges, which has been thinned in a pressing or grinding operation.

6. A sound attenuating wall as claimed in claim 1, wherein insulating material fills only part of each of the spaces existing between the frame members and between the surface coverings.

7. A sound attenuating wall as claimed in claim 6, wherein the insulating material is in the lower portion of the space between by the surface coverings.

8. A sound attenuating wall as claimed in claim 6, wherein the insulating material fills out approximately two fifths of the otherwise unfilled space.

9. A sound attenuating wall, substantially as hereinbefore described with reference to Figs. 1, 4, 5 and 6 in the accompanying drawings.

10. A sound attenuating wall, substantially as hereinbefore described with reference to Figs. 2, 4, 5 and 6 in the accompanying drawings.

11. A sound attenuating wall, substantially as hereinbefore described with reference to Figs. 3 to 6 in the accompanying drawings.

12. Skeleton frame members, substantially as hereinbefore described with reference to Figs. 1 to 4 and for use in sound attenuating walls.

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Printed for Her Majesty's Stationery Office by The Tweeddale Press Ltd., Berwick-upon-Tweed, 1977.
Published at the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1 483 622 COMPLETE SPECIFICATION
3 SHEETS

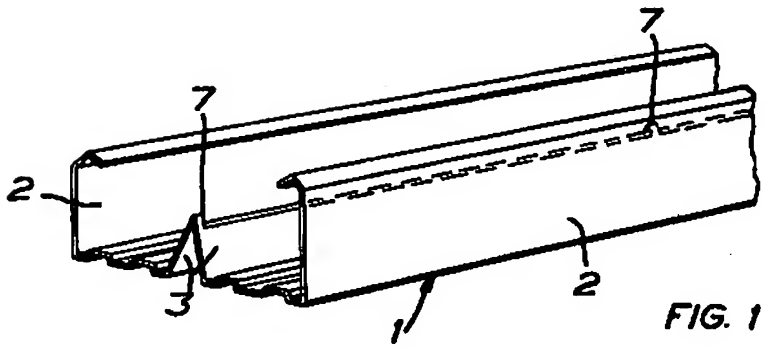

FIG. 1

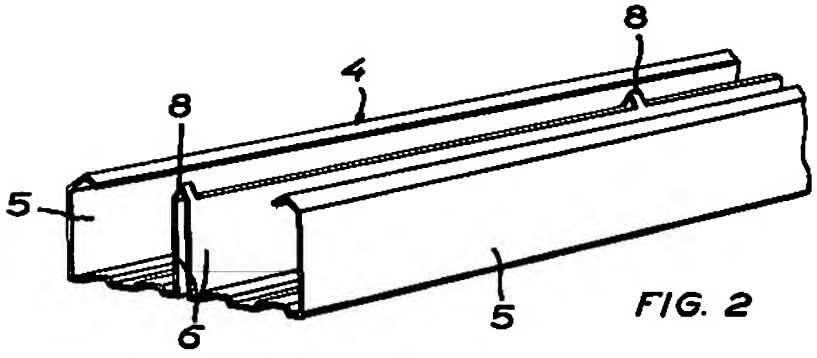

FIG. 2

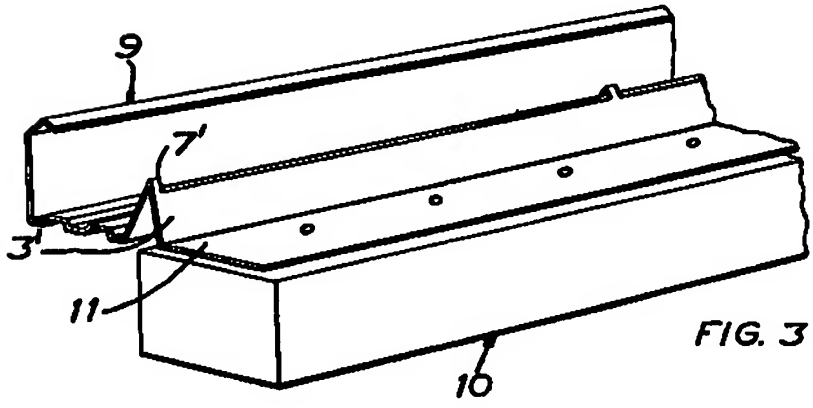

FIG. 3

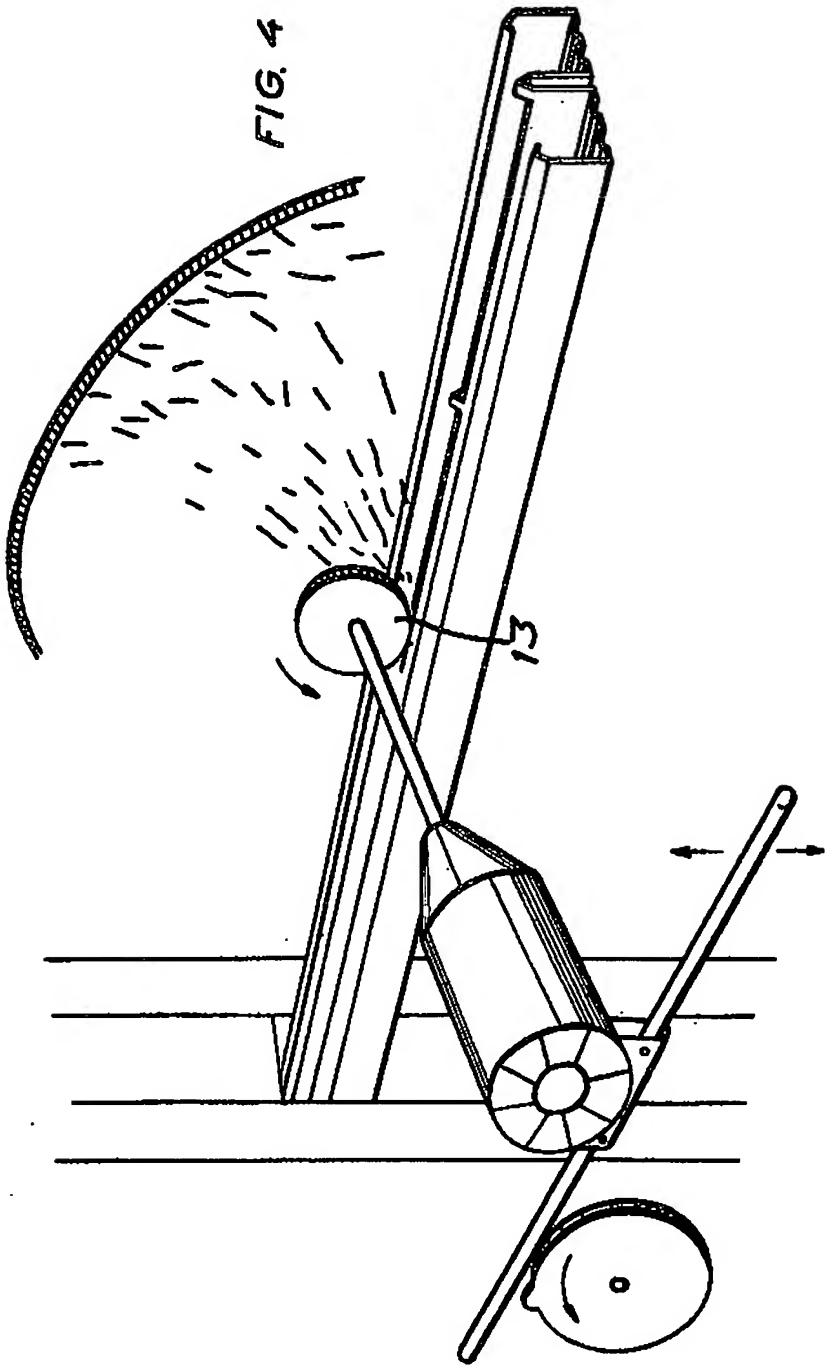
FIG. 4
13

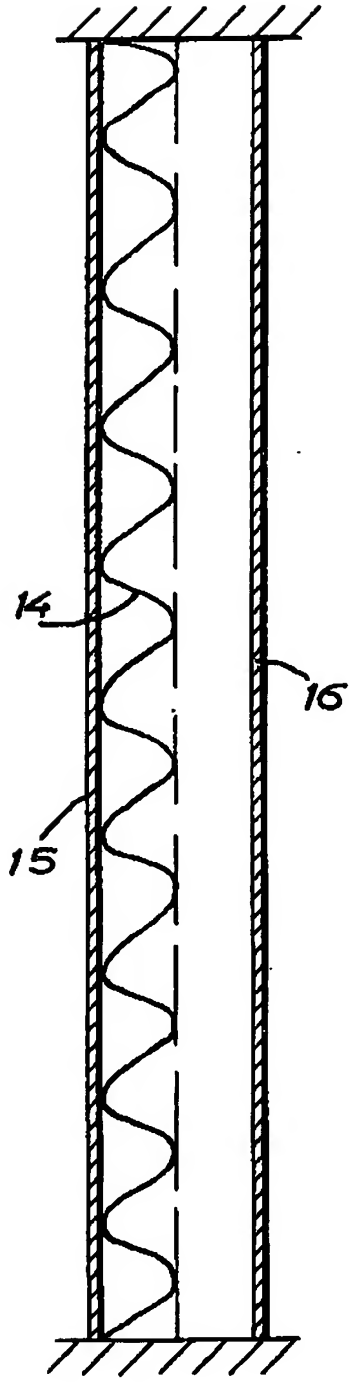

FIG. 5

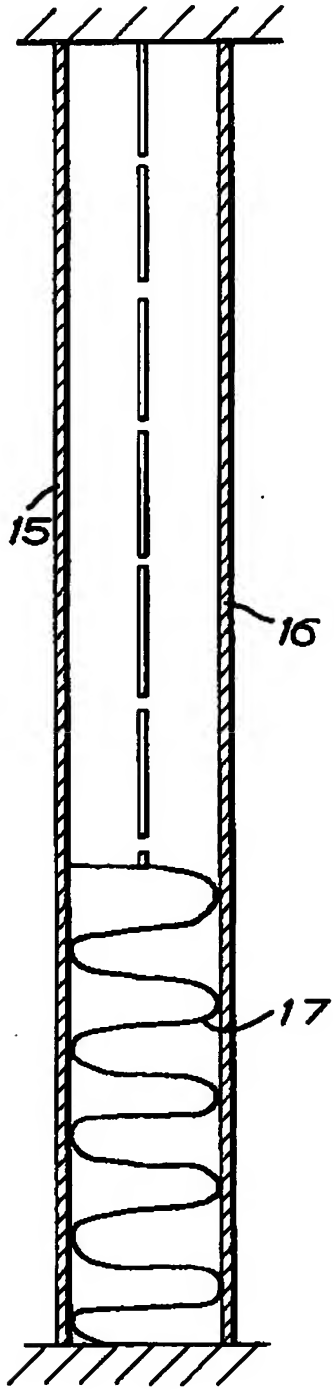

FIG. 6